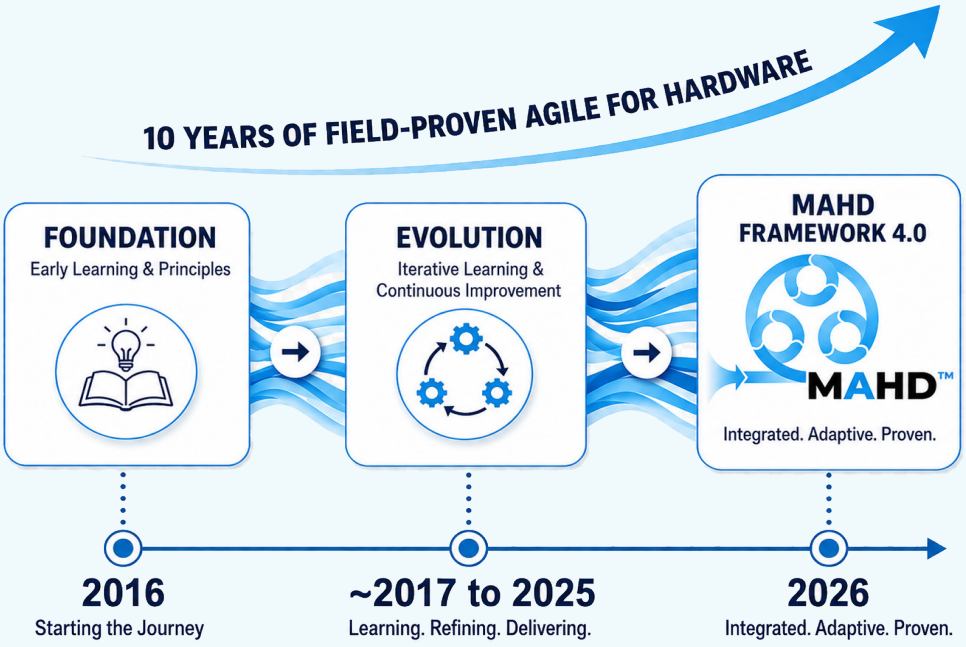
MODIFIED™ AGILE FOR HARDWARE DEVELOPMENT

MAHD FRAMEWORK 4.0

A FOUR-PART INTRODUCTION SERIES: PART 1

The Next Evolution of the MAHD Framework

10 Years of Field Learning Built into the Next Generation of Hardware Agility



BY DORIAN SIMPSON

MAHD FOUNDER AND CHIEF EVANGELIST

What Is the MAHD Framework?

The **Modified Agile for Hardware Development (MAHD) Framework®** is a practical operating model for applying agile principles to hardware-based products and complex systems. It helps cross-functional teams align around customer and business outcomes, learn through rapid integration and prototyping, make difficult tradeoffs with the right people and evidence, and adapt without sacrificing the discipline hardware development requires.

This first article in the MAHD 4.0 series looks back at ten years of field experience: what enabled breakthrough results, why some implementations stalled, and how those lessons shaped a framework that is easier to learn, faster to implement, and more durable in practice.

A Nine-Month Deadline

I almost let the call go to voicemail. The phone was already in my hand, and the California area code was familiar, so I answered.

The caller was Jim, the newly appointed vice president of new products at a growing energy-storage company. He had watched a webinar on the MAHD Framework and wanted to move quickly. His company had committed to a system intended to leapfrog the competition. Jim believed his team had the talent, technology, and motivation to deliver it. What they did not have was time.

The team estimated at least 18 months and, given its history of development and certification delays, perhaps two years. Jim needed more than 100 people in California and India to deliver a working system to a committed customer in nine months.

"Dorian," he said, "in the webinar you claimed that MAHD could help teams develop products 50% faster."

"It is possible," I told him. "But your team has been working in a traditional, requirements-driven system. They could spend half of the nine months defining requirements before meaningful learning begins. To hit this target, they will need to change their mindset immediately, and they will need your active support."

Jim thought for less than a second. "When can the training start?"

Three weeks later, after two and a half days of training across two sites, the team had clarified strategic intent with an Agile Vision Brief, connected prioritized Customer Outcomes to Solution

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Elements through Matrix Thinking, identified the Big Rocks, and entered its first four-week IPAC Iteration. Its initial goals were tangible: demonstrate a physical system mockup and validate a vertical slice of the energy-management system against a critical throughput target.

Nine months later, the customer received the working system, followed by a successful commercial launch. The path was not easy. There were missteps, painful tradeoffs, ruffled feathers, long nights, and a strained budget. But the team delivered what had initially appeared impossible.

The team did not succeed because MAHD eliminated uncertainty. It succeeded because leaders and teams learned to navigate uncertainty together.

Why They Succeeded, and Why Such Results Are Rare

This is a true story, but not a typical first implementation. Many organizations eventually achieve comparable improvements, but rarely with such urgency or in a single leap. The team benefited from conditions that are easy to describe and difficult to reproduce.

A senior leader sponsored a different way of working, participated directly, and protected the team when tensions emerged. The essential product, technical, and program roles were filled by talented people open to learning and candid debate. The organization accepted that it could not define everything before starting, and the team sought coaching before problems became crises.

Those conditions created permission to change. The breakthrough in performance came from what happened next. The team built a shared language for priorities, uncertainty, and tradeoffs; treated healthy cross-disciplinary friction as useful information; stayed focused on strategic intent and real constraints; and developed a practical decision engine for making difficult tradeoffs with the right people and the right evidence.

After a decade of MAHD deployments, the pattern is clear. Agile for hardware succeeds when leadership, systems thinking, focus, and open collaboration reinforce one another. Organizations that treat MAHD, or agile itself, as a cosmetic overlay often preserve the assumptions and governance habits that created the problem.

MAHD can deliver results quickly. But only when the organization is willing to make a real change.

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The Hard Truth About Hardware Development

The hardest part of hardware development is rarely engineering itself. As a former engineer and technical leader, I have spent much of my career around people who know how to create solutions. That is what engineers do and, for many, what they live for.

The harder challenge is turning technical possibility into a winning product while constraints are real and the path is uncertain. Teams must balance customer outcomes, feasibility, cost, quality, regulations, suppliers, manufacturing, architecture, resources, and time to market. An early, uninformed decision can make or break market success. When I ask executives what success would look like, I often hear: "If we could nail down the requirements before development starts, we would eliminate a great deal of waste." The instinct is understandable, but it can intensify the problem.

Customers do not typically have "requirements." They have problems, desired outcomes, and needs. Products decisions involve attributes, constraints, and tradeoffs. Markets evolve as well. Requirements are an organization's current translation of what it believes the product must do. Treating them as certainty encourages premature commitment to untested assumptions.

The challenge is not to create certainty before starting. It is to build a disciplined system for learning and making better decisions while uncertainty still exists.

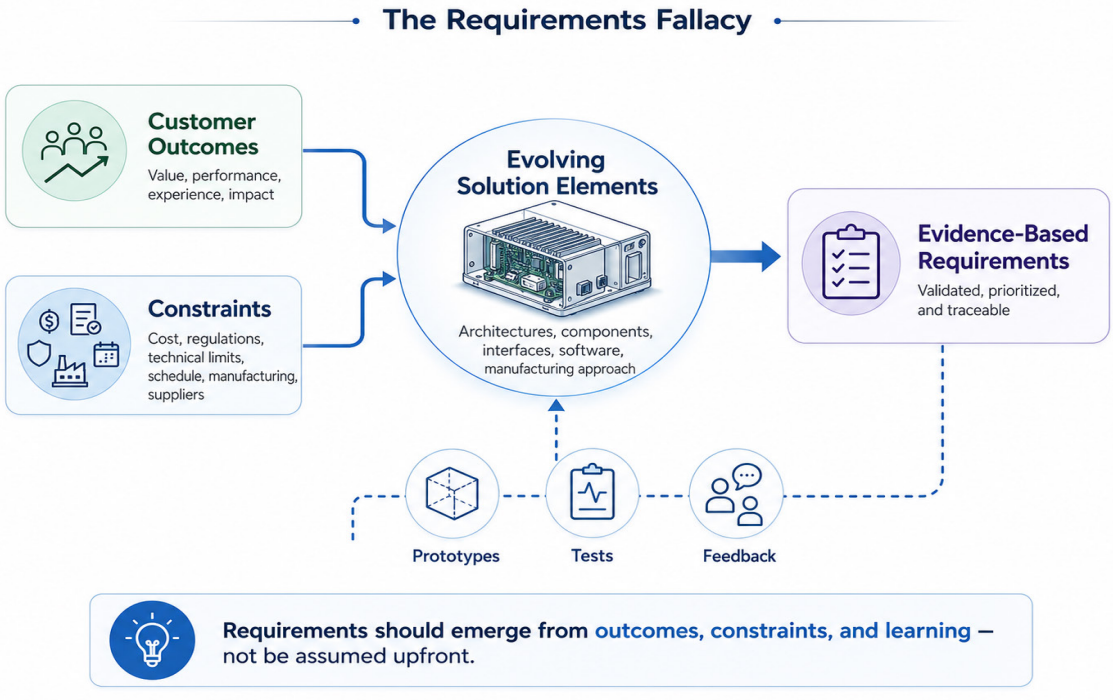

Figure 1. Understanding the Requirements Fallacy Is Essential to Success

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What the Field Data Suggests

Speed is the outcome many organizations ask about first, but it is not always the most valuable benefit. In MAHD's 2024 deployment survey of over 100 project teams, 55% of respondents reported or anticipated development acceleration of roughly 20% to 30%, while 18% reported or anticipated gains of 40% to 50%. The remaining 27% reported or anticipated improvements of up to 15%.

These figures are field evidence, not a controlled study. Projects began from different baselines and faced different technical and organizational conditions. Even so, the pattern is consistent: when teams improve the quality and timing of learning, alignment, and decisions, speed and efficiency tend to follow.

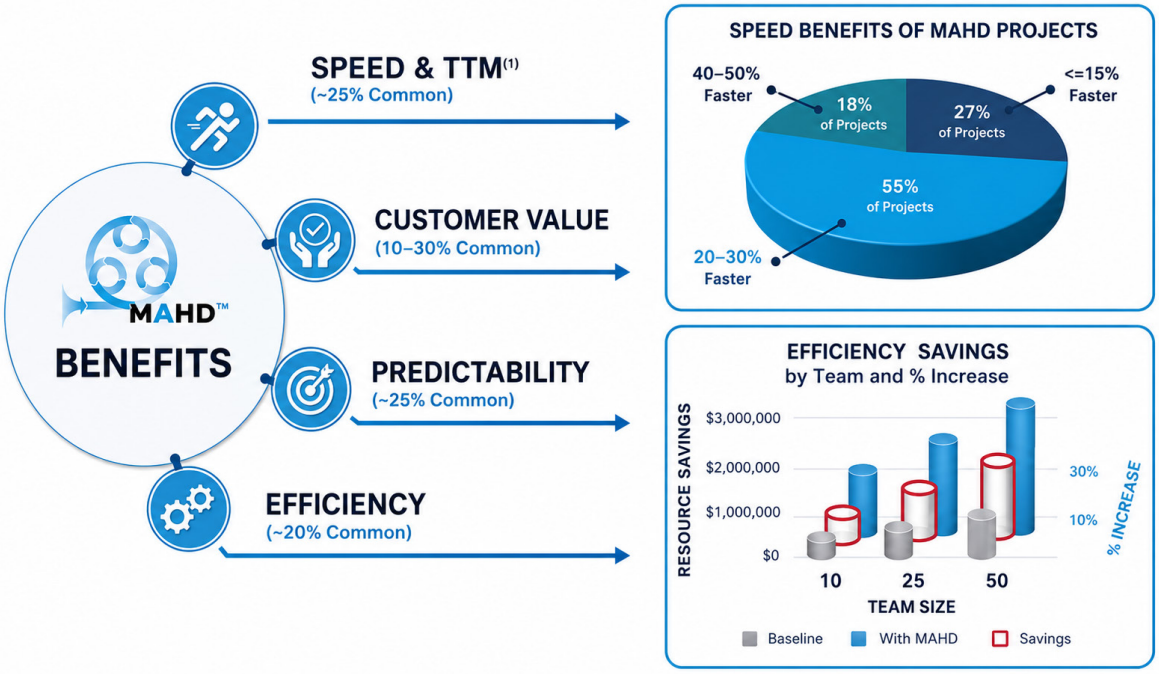

Figure 2. MAHD Delivers a Range of Benefits, with Faster Concept-to-Launch Performance Most Desired

(1) 2024 Survey of MAHD Deployments - "From initial approval to first customer shipment, what change in time-to-market have you experienced, or do you anticipate, for the projects developed using the MAHD Framework? (In increments of 5%)"

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Ten Years of Learning from Real Projects and Teams

MAHD was created to address a specific gap. Staged-development approaches provide useful structure and investment discipline, but they often encourage teams to treat assumptions as fixed requirements and defer integration and learning until late. Agile offered a powerful alternative, but most familiar tactics were designed around software and did not fully address physical dependencies, supplier lead times, manufacturing, capital investment, system integration, and difficult hardware tradeoffs.

Development of MAHD began in 2016. Since then, it has been applied across industries, organizational sizes, project types, and levels of complexity. Those experiences revealed what helps teams accelerate, where organizations stall, and why even carefully designed methods can fail to change daily behavior.

The most successful teams were not merely adopting agile practices. They were changing how they thought about product development. They aligned around outcomes before locking in solutions, attacked the largest unknowns early, involved the right people in consequential decisions, and evolved the product, plan, evidence, and business case together.

But MAHD is not only about speed. A framework is a tool, and its value depends on the outcome the organization needs.

One robotics company had strong market share but chronically weak margins. Its engineers continually added features and enhanced performance, yet customers did not value many of those differentiators enough to pay for them. The company had to discount heavily to achieve volume.

Using MAHD, the team re-centered the work on prioritized Customer Outcomes, explored alternatives through rapid prototypes, gathered feedback earlier, and made tradeoffs before locking in designs.

The team had planned new attachments for a commercial floor-cleaning robot, but low-fidelity prototypes revealed that customers valued better self-cleaning and rarely used the attachments already included. The team redirected investment, increased satisfaction, reduced bill-of-materials (BOM) costs, and improved margins by more than 25% over two years.

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Why Many Agile Transformations Disappoint

Many hardware teams believe they understand agile. They learn the vocabulary, adopt shorter planning cycles, add standups and retrospectives, create backlogs, and install software that makes unfinished tasks more visible.

Then reality hits. The new tactics do not materially improve the work. Meetings become more frequent but only slightly shorter. Transparency and administrative overhead rise together. Gate reviews remain contentious, decisions are delayed, and functions continue to optimize locally. There is little acceleration and no meaningful efficiency gain.

The problem is not that software-oriented agile practices are inherently wrong. Many are useful. The problem is assuming that the practices alone constitute an operating model for hardware development.

We have also seen MAHD implementations fall short. Those failures are equally instructive and tend to share three characteristics:

- No visible senior champion, incomplete participation from essential roles, and little investment in training or coaching.
- An unwillingness to rethink requirements, milestones, governance, and early learning while expecting new tactics to fit inside the old system.
- A view that MAHD is a set of project-management tools rather than a cross-functional way of thinking, deciding, and working.

Some teams gain early momentum, then lose it as competing priorities, legacy processes, and functional incentives reassert themselves.

Under pressure, people return to familiar behavior: detailed plans built on weak assumptions, functional task lists, late escalation, and reviews centered on status rather than evidence and decisions.

A common example is a single function embracing agile without support from the broader system. One subsystem team received MAHD training but depended on other groups for integration, testing, and customer outcomes. Those groups remained committed to waterfall, demanding complete requirements and resisting early subsystem versions. The team gained focus and transparency, but the surrounding process eventually overwhelmed the effort. Local agility could not compensate for system-level misalignment.

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The Design Standard Behind MAHD 4.0

Organizations often conduct root-cause analyses after failure. While refining MAHD 4.0, we asked a different question: What are the root causes of repeatable success?

The answer was not another template, meeting, or tool. Success came from the connections among beliefs, decision habits, organizational capabilities, and daily practices, and from whether those connections held when the project became difficult.

A principle matters only if it changes how people work. A method matters only if it creates demonstrable value. A process matters only if teams can use it when pressure is highest.

That became the design standard for MAHD 4.0. Every Principle, Guiding Concept, Enabling Capability, Method, Tactic and Activity must earn its place. Each should clarify intent, expose uncertainty, improve collaboration, reduce waste, strengthen a decision, or improve an outcome. If an element sounds noble but offers no practical guidance, it should be refined, replaced, or removed.

MAHD 4.0 is therefore an evolution, not a reinvention. The core structure and proven methods remain. What changes is the clarity of the Operating Model, the strength of its connections, the quality of the guidance, and the support that helps teams make the new way of working durable.

Introducing MAHD Framework 4.0

MAHD 4.0 integrates ten years of field experience, customer feedback, coaching insight, and continuous improvement into a more complete Operating Model. It is designed to be easier to learn, faster to implement, and more resistant to the pull of old habits.

The evolution focuses on three areas:

- Connect Principles, Guiding Concepts, Enabling Capabilities, and tactics so every layer of the framework has visible purpose.
- Strengthen the MAHD On-Ramp so teams can create a clear, aligned path into execution without pretending everything is known.
- Improve the guidance, tools, and reinforcement that help teams execute consistently, adapt intelligently, and sustain results.

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1. Where MAHD Comes Together: From Principles to Practical Action

Principles are powerful. They shape movements, cultures, and institutions. Agile itself began with values intended to change how people thought about product development.

But principles lose power when they become aspirational soundbites. An original MAHD Principle, Empowered Teams, sounded right and reflected a widely admired ideal. Yet it offered too little guidance for hardware decisions, where teams need autonomy while leaders remain accountable for investment, margin, timing, architecture, risk, and market outcomes.

That realization prompted a broader review. We did not want any MAHD Principle to survive simply because its language was familiar. Every Principle needed to connect to the concepts, capabilities, decisions, and actions required for a better result.

The MAHD 4.0 Operating Model, as summarized in Figure 3, makes that relationship explicit:

Principles shape beliefs and behavior. Guiding Concepts help teams determine the right move. Enabling Capabilities make sophisticated execution possible. Methods, tactics, and activities turn the model into daily action.

Over time, questions such as "What are the Big Rocks?", "What is the simplest vertical slice?", "What does good enough mean here?", and "What do we need to plan backward from?" become organizational shorthand. They compress experience into faster, more aligned decisions.

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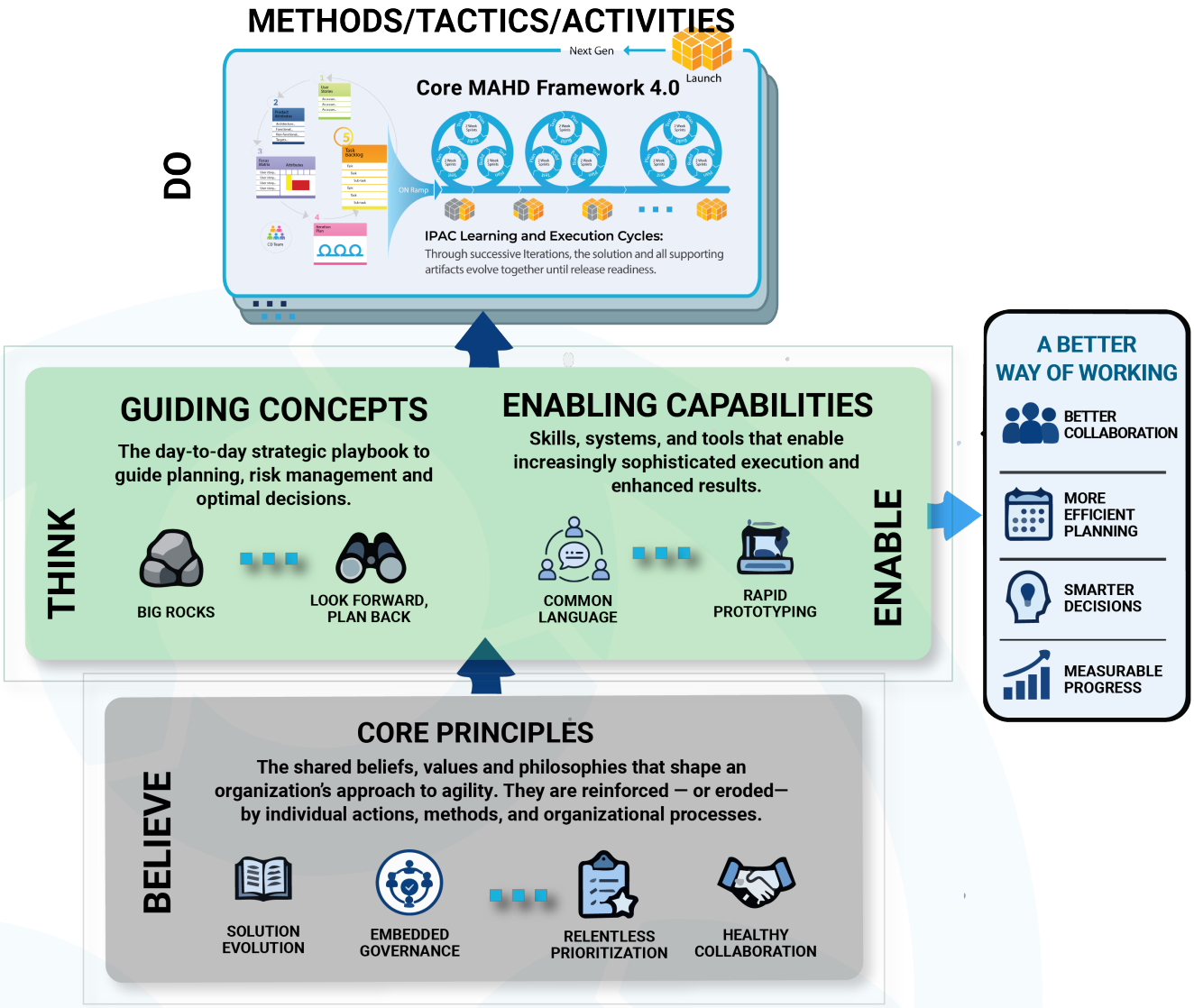

Figure 3. MAHD 4.0 connects core Principles, practical decision guidance, enabling capabilities, and execution methods to a better way of working.

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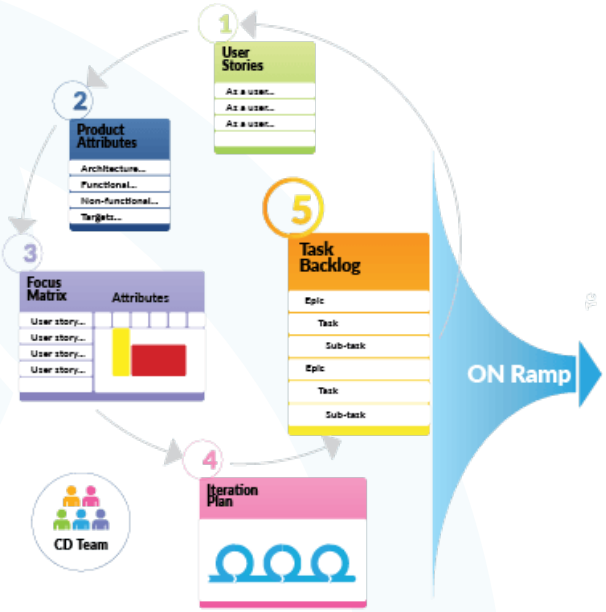
2. The Enhanced MAHD On-Ramp: A Stronger Start

How a project begins, who is involved, what is made explicit, which assumptions are challenged, and how the first learning priorities are chosen shape everything that follows.

Teams fall into two common traps. They either begin without enough shared understanding of strategic intent, Customer Outcomes, solution possibilities, risks, and constraints, or spend months defining complete requirements and detailed plans before meaningful learning. The first creates confusion and rework. The second delays progress and produces plans that quickly lose relevance.

The MAHD On-Ramp has always provided a productive middle ground: enough clarity to begin with confidence while preserving flexibility to learn and adapt. MAHD 4.0 makes that path easier to teach, facilitate, and repeat.



The enhanced On-Ramp more clearly connects the Vision Brief, Customer Outcomes, Solution Elements, Focus Matrix, preliminary Prototype Plan, Initial IPAC Iteration Plan, and backlog. Together, they clarify why the project matters, which outcomes are most important, what possibilities deserve exploration, which uncertainties could change the path, and what the team should learn, integrate, demonstrate, or decide first.

The result is not a perfect plan. It is a more useful definition of readiness to execute. Teams enter IPAC Planning with clearer priorities and less rework, while leaders gain earlier visibility into intent, risk, options, and approaching decisions.

A common On-Ramp also creates consistent expectations without forcing every project into an identical process.

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3. Making Agile Stick Throughout Execution

Starting is often easier than sustaining. Training creates understanding and enthusiasm, but daily pressure tests whether new behaviors will survive.

When schedules tighten, teams often interpret new methods through old habits. They return to detailed upfront plans, functional task tracking, isolated decisions, and reactive problem-solving. Backlogs become task lists, milestones become dates, and reviews become status updates. The organization keeps the language of agile while restoring the logic of waterfall.

MAHD 4.0 provides clearer guidance for the flow of execution, not just the launch. It strengthens IPAC Planning and Reviews, connects sprint-level work to larger learning and integration goals, maintains traceability without excessive bureaucracy, uses management check-ins for decisions and support, and turns process reviews into a mechanism for improving how the team works.

Guiding Concepts such as Big Rocks, vertical slices, strategic flexibility, prototype fidelity, divergent-convergent cycles, Context-Based Good Enough, and Look Forward/Plan Back become prompts for difficult conversations. Enabling Capabilities such as common language, customer insight, matrix thinking, flexible architecture, decision systems, rapid prototyping, and digital and AI-enabled tools make those conversations more sophisticated and repeatable.

The aim is not rigid standardization. It is consistent thinking, language, and decision-making, with enough flexibility for different products, technologies, regulatory environments, and levels of complexity.

Over time, the framework becomes less dependent on a coach, training event, or small group of champions. It becomes part of the organization's operating rhythm: a durable way to align, learn, decide, and adapt.

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The Next Chapter

MAHD has always evolved by applying the same logic it asks teams to use: learn from evidence, adapt deliberately, improve the system, and repeat. The fourth major release is not the end of that process. It is a platform for the next decade of learning. The next three articles will examine the core changes in greater depth:

- **Where MAHD Comes Together:** How Principles, Guiding Concepts, Enabling Capabilities, and Methods/Tactics connect in the moments that matter.
- **The Enhanced MAHD On-Ramp:** How teams align earlier, identify the right learning, and enter execution with greater focus and momentum.
- **A Better Way to Execute:** How teams translate the Operating Model into everyday planning, reviews, decisions, and measurable progress.

In the months ahead, we will also explore each MAHD Principle, Guiding Concept, and Enabling Capability as a practical lever for improving product-development performance.

Join the MAHD 4.0 Conversation

We invite you to a live introduction to MAHD Framework 4.0. We will share what changed, why it matters, what ten years of field experience taught us, and how the updated framework can help teams achieve faster development, greater efficiency, higher-value solutions, and more predictable outcomes.

The discussion will include guidance for organizations that are beginning their MAHD journey or ready to take an existing MAHD implementation to the next level.

Learn More and Register for the Webinar: An Introduction to MAHD 4.0

We hope you will share the journey. We may become philosophical at times because principles and operating beliefs matter. But we will always return to the practical question that has guided MAHD from the beginning: What will help real teams develop winning hardware-based products and systems faster, with higher value, less waste, and greater confidence in the path forward?

The future of hardware development will not belong to organizations that eliminate uncertainty. It will belong to those that learn, decide, and adapt better while uncertainty remains

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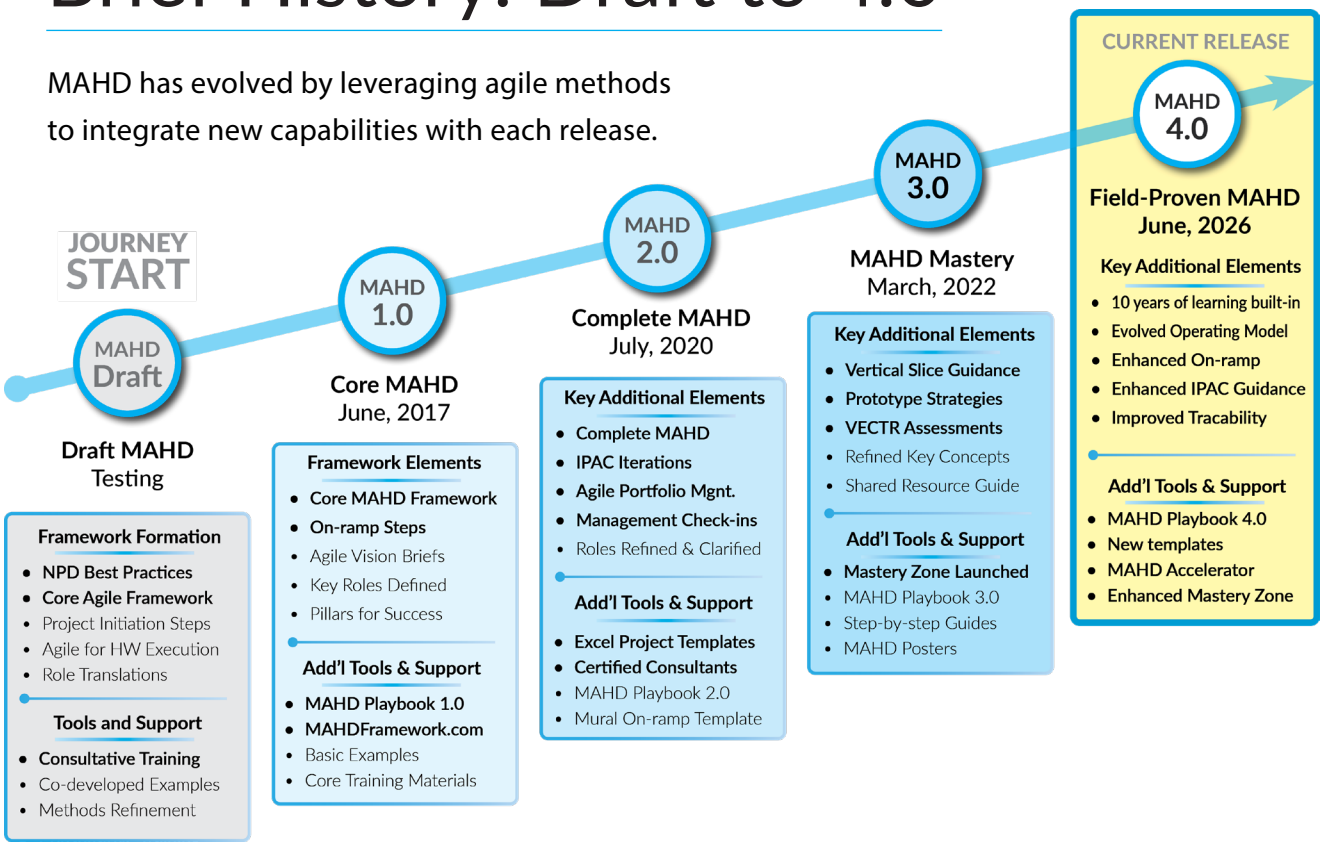
THE EVOLUTION OF MAHD

Brief History: Draft to 4.0

MAHD has evolved by leveraging agile methods to integrate new capabilities with each release.



GETTING STARTED

Below are three great options to get started with the MAHD Framework. Contact us to discuss your situation or get help visualizing how your projects can benefit from agile methods.

EXPLORE

GET AN OVERVIEW

Contact the MAHD team to set up a complimentary 45-minute consultation

- Review your situation and goals
- Overview of the MAHD Framework
- Determine if MAHD is right for you
- How to best get started

PILOT

TRAIN AND PILOT

The fastest way to start is to train a focused team and pilot a project

- Identify a pilot team and project
- Get hands-on MAHD training
- Execute MAHD w/facilitation
- Learn, improve and repeat

RECOMMENDED

SCALE

CUSTOM ROLLOUT

This is a great option if you know MAHD is right for your whole organization

- Establish clear development goals
- Identify areas for improvement
- Develop a roadmap w/milestones
- Pilot, learn, expand

To learn more, download resources, or set up your complimentary consultation, visit:

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web: www.MAHDFramework.com
email: info@mahdframework.com